



National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|-----------------------------------|-------------------------|-------------|
| Location: | Flushing, NY | Accident Number: | NYC03FA190 |
| Date & Time: | 09/04/2003, 0624 EDT | Registration: | N1450A |
| Aircraft: | Fokker F.28 Mk 0100 | Aircraft Damage: | Substantial |
| Defining Event: | | Injuries: | 38 None |
| Flight Conducted Under: | Part 121: Air Carrier - Scheduled | | |

Analysis

After takeoff the airplane encountered a large flock of Canadian geese. The crew reported hearing a series of loud noises, followed by the failure of the right engine. The airplane subsequently made an emergency landing at a nearby airport. Post-accident examination of the airplane revealed damage to the nose, fuselage, and right engine consistent with multiple bird strikes. The right engine fan blades were deformed, and had received leading edge impact damage. One fan blade had separated at the root. Additionally, a hole was found in the right engine inlet duct, which coincided with a penetration in the fuselage above the aft-most window on the right side of the airplane. The blade that penetrated the fuselage was not recovered.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An in-flight collision with birds.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. (C) OBJECT - BIRD(S)

Occurrence #2: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

2. 1 ENGINE

Factual Information

HISTORY OF FLIGHT

On September 4, 2003, at 0624 eastern daylight time, a Fokker F.28 Mk 0100, N1450A, operated by American Airlines as flight 549, was substantially damaged during the initial climb after takeoff from La Guardia Airport (LGA), Flushing, New York. There were no injuries to the two certificated airline transport pilots, two flight attendants, or 34 passengers. Visual meteorological conditions prevailed for the scheduled, domestic passenger flight, destined for Midway Airport (MDW), Chicago, Illinois. The flight was conducted on an instrument flight rules flight plan under 14 CFR Part 121.

According to written statements submitted by the captain and first officer, flight 549 departed the gate at 0611, and proceeded to runway 13 for takeoff. After takeoff the airplane encountered a large flock of birds. The crew reported hearing a series of loud noises, followed by the failure of the right engine. The airplane then began to experience "heavy vibrations." The crew declared an emergency with air traffic control (ATC), and the captain proceeded with the emergency checklists while the first officer flew the airplane.

The crew informed ATC of their intention to divert to John F Kennedy International Airport (JFK), New York, New York, and ATC provided radar vectors to the airport. The flight crew reported that the airplane continued to experience vibrations until landing. After landing, maintenance personnel inspected the landing gear and the airplane taxied to a gate where the passengers deplaned through the jetway.

METEOROLOGICAL INFORMATION

The weather reported at LaGuardia Airport, at 0551, included winds from 200 degrees true at 8 knots, 4 statute miles visibility in mist, few clouds at 900 feet, a broken ceiling at 1,200 feet, an overcast ceiling at 6,000 feet, temperature 72 degrees Fahrenheit, dew point 72 degrees Fahrenheit, and a barometric pressure of 29.84 inches of mercury.

AIRDROME INFORMATION

La Guardia airport was certificated under 14 CFR Part 139. The area north of runway 13/31, and east of runway 4/22 was grass, and a known habitat for Canada geese, and other birds. According to Federal Aviation Administration, (FAA) information published about the airport, the additional remarks stated "flocks of birds on and in the vicinity of the airport." Included in the certification requirements for the airport, was the development and maintenance of a wildlife maintenance plan.

FLIGHT RECORDERS

Cockpit Voice Recorder

The 2-hour recording was found to contain no data that could contribute to determining the probable cause. Therefore, no transcript was prepared.

Flight Data Recorder

According to the digital flight data recorder (DFDR), at subframe reference number (SRN) 276672, the weight on wheel (WOW) switches for both main landing gear transitioned from

ground to air. At SRN 276674, the right engine low-pressure rotor speed (N1) had reduced from 88 percent to 36 percent. At SRN 276675, the right engine fail discrete code had transitioned from OK to fail.

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane revealed a 20 by 36-inch wide depression on the right side of the nose, behind the radome. The maximum depth of the depression was between 3 and 4 inches. Stringers in the depressed area were deformed and cracked.

Impact marks were found on the right wing at 15 and 18 feet outboard from the fuselage. There was no visible damage to the wings. Feathers and blood smears were visible on the right side wing root and the aft portion of fuselage adjacent to the right engine.

The right engine was examined, and additional bird remains were noted on the engine inlet cowling and inside the engine. The fan disk could be rotated with fingertip pressure. Three separate areas of soft body impact damage were noted on the fan blades. One fan blade was separated from the fan disk at the root. The remaining fan blades were deformed, and had received leading edge impact damage.

There was a 9 1/2-inch long circumferential by 2-inch wide axial hole in the bottom of the fan case, directly aft of the fan blades' plane of rotation. A tab of metal curled outward from the hole, and two fan blade pieces were found laying in the bottom of the fan duct, over the hole in the fan case. A hole was also found in the engine inlet duct, which coincided with an "L" shaped penetration in the fuselage, 6 inches above the aft-most window on the right side of the airplane. The penetration moved upward for 7 inches and was about 2-3/8 inches wide. The underlying insulation and plastic side panel were not penetrated. The blade that penetrated the fuselage was not recovered.

TESTS AND RESEARCH

The right engine's fan case was submitted to the manufacturer for metallurgical examination. The examination revealed that the fan case's wall thickness and composition conformed to design specifications.

All bird remains collected from the airport and from the airplane were collected. The remains were identified as five Canada geese.

The wildlife management plan for LaGuardia Airport was approved by the FAA on December 13, 2002. According to the plan, wildlife patrol supervisors would check the airport for wildlife activity throughout the day. According to airport operations staff, this patrol occurred three times per day during daylight hours, and on the morning of the accident, the wildlife patrol supervisor was in the process of conducting the morning wildlife patrol. In addition to the inspections conducted by the wildlife patrol supervisor, the airport duty manager conducted an airport self-inspection three times daily. The airport duty manager had inspected both runways at 0500.

There was a tidal flat area north of runway 31 where gulls and Canada geese normally congregated because of its proximity to the water. According to airport operations personnel, the oncoming wildlife patrol supervisor would check those potential trouble spots more closely during their inspection. If the supervisor observed birds, or any other wildlife construed as a hazard, the supervisor would attempt to disperse the wildlife with their vehicle. If the wildlife was not deterred, the supervisor would then attempt to use a flare pistol, and if still

unsuccessful, use a shotgun to kill the wildlife hazard.

There was an island located to the north-northeast of the airport, which also attracted Canada geese. This area was of concern to the airport operations personnel because of its close proximity to the runways. The airport and the Department of Agriculture (USDA) had worked together to reduce the population of Canada geese on the island.

ADDITIONAL INFORMATION

The airplane was equipped with two Rolls-Royce TAY 650-15 engines. In addition to the cockpit controlled fuel cutoff, the engines were also equipped with an automatic emergency fuel shutoff (EFSO) system that would activate when there was a low pressure turbine drive shaft fracture, or there was engine damage that resulted in high vibration. According to the airplane's operating manual, internal engine failures that activate the EFSO system may restrict the movement of the fuel shutoff lever to the CUFOFF position.

In the cockpit, the right engine fire handle was found pulled, and the right engine fuel cutoff lever was in the mid-range position. When checked, the fuel cutoff lever would not go to the idle-cutoff position. Further examination revealed that the right engine's EFSO system had activated.

Pilot Information

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|----------------------------------|---|--|----------------------------|
| Certificate: | Airline Transport; Flight Instructor | Age: | 42, Male |
| Airplane Rating(s): | Multi-engine Land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | Instrument Airplane | Toxicology Performed: | No |
| Medical Certification: | Class 1 Valid Medical--no waivers/lim. | Last FAA Medical Exam: | 06/12/2003 |
| Occupational Pilot: | | Last Flight Review or Equivalent: | 07/01/2003 |
| Flight Time: | 10000 hours (Total, all aircraft), 1400 hours (Total, this make and model), 65 hours (Last 30 days, all aircraft) | | |

Co-Pilot Information

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|----------------------------------|--|--|----------------------------|
| Certificate: | Airline Transport; Flight Engineer | Age: | 33, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Right |
| Other Aircraft Rating(s): | None | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | None | Toxicology Performed: | No |
| Medical Certification: | Class 2 Valid Medical--no waivers/lim. | Last FAA Medical Exam: | 03/06/2003 |
| Occupational Pilot: | | Last Flight Review or Equivalent: | 07/25/2003 |
| Flight Time: | 4987 hours (Total, all aircraft), 918 hours (Total, this make and model), 2827 hours (Pilot In Command, all aircraft), 223 hours (Last 90 days, all aircraft), 77 hours (Last 30 days, all aircraft), 14 hours (Last 24 hours, all aircraft) | | |

Aircraft and Owner/Operator Information

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|--------------------------------------|--------------------------------------|---------------------------------------|--------------------|
| Aircraft Make: | Fokker | Registration: | N1450A |
| Model/Series: | F.28 Mk 0100 | Aircraft Category: | Airplane |
| Year of Manufacture: | | Amateur Built: | No |
| Airworthiness Certificate: | Transport | Serial Number: | 11459 |
| Landing Gear Type: | Retractable - Tricycle | Seats: | 93 |
| Date/Type of Last Inspection: | 08/08/2003, Continuous Airworthiness | Certified Max Gross Wt.: | |
| Time Since Last Inspection: | 201 Hours | Engines: | 2 Turbo Fan |
| Airframe Total Time: | 25174 Hours | Engine Manufacturer: | Rolls-Royce |
| ELT: | Installed, not activated | Engine Model/Series: | TAY650-1-5 |
| Registered Owner: | American Airlines | Rated Power: | 15000 lbs |
| Operator: | American Airlines | Operating Certificate(s) Held: | Flag carrier (121) |
| Operator Does Business As: | | Operator Designator Code: | AALA |

Meteorological Information and Flight Plan

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|----------------------------------|----------------------|---|------------------|
| Conditions at Accident Site: | Visual Conditions | Condition of Light: | Day |
| Observation Facility, Elevation: | LGA, 22 ft msl | Distance from Accident Site: | 0 Nautical Miles |
| Observation Time: | 0551 EDT | Direction from Accident Site: | 0° |
| Lowest Cloud Condition: | Few / 900 ft agl | Visibility | 4 Miles |
| Lowest Ceiling: | Broken / 1200 ft agl | Visibility (RVR): | |
| Wind Speed/Gusts: | 8 knots / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 200° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 29.84 inches Hg | Temperature/Dew Point: | 22° C / 22° C |
| Precipitation and Obscuration: | | | |
| Departure Point: | Flushing, NY (LGA) | Type of Flight Plan Filed: | IFR |
| Destination: | Chicago, IL (MDW) | Type of Clearance: | IFR |
| Departure Time: | 0624 EDT | Type of Airspace: | Class B |

Airport Information

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|----------------------|--------------------------|---------------------------|-------------------|
| Airport: | La Guardia Airport (LGA) | Runway Surface Type: | Asphalt; Concrete |
| Airport Elevation: | 22 ft | Runway Surface Condition: | Unknown |
| Runway Used: | 13 | IFR Approach: | Unknown |
| Runway Length/Width: | 7000 ft / 150 ft | VFR Approach/Landing: | Unknown |

Wreckage and Impact Information

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|---------------------|---------|----------------------|-----------------------|
| Crew Injuries: | 4 None | Aircraft Damage: | Substantial |
| Passenger Injuries: | 34 None | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 38 None | Latitude, Longitude: | 40.775000, -73.863333 |

Administrative Information

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|-----------------------------------|--|--------------|------------|
| Investigator In Charge (IIC): | Robert L Hancock | Report Date: | 01/24/2005 |
| Additional Participating Persons: | T. C Chan; FAA/FSDO; Garden City, NY Michael A Weber; Rolls-Royce; Indianapolis, IN Rich Lawson; American Airlines; Fort Worth, TX | | |
| Publish Date: | | | |
| Investigation Docket: | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ . | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).